



**Semester 1 Examinations 2013/ 2014**

<b>Exam Code(s)</b>	4BCT1
<b>Exam(s)</b>	4 <sup>th</sup> Year Examination Computing Science and IT
<b>Module Code(s)</b>	CT421
<b>Module(s)</b>	Artificial Intelligence
<b>Paper No.</b>	1
<b>Repeat Paper</b>	No
<b>External Examiner(s)</b>	Professor Liam Maguire
<b>Internal Examiner(s)</b>	Professor G Lyons Dr. M Madden *Dr. C Mulvihill *Dr. F Smith

**Instructions:** Answer 2 questions from each section. All questions will be marked equally. Use a separate answer book for each section.

<b>Duration</b>	2 hours
<b>No. of Pages</b>	3
<b>Discipline(s)</b>	IT
<b>Course Co-ordinator(s)</b>	

**Requirements:**

MCQ	Release to Library: Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
Handout	None			
Statistical/ Log Tables	None			
Cambridge Tables	None			
Graph Paper	None			
Log Graph Paper	None			
Other Materials	None			
Graphic material in colour	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>

**PTO**

## **Section A**

1

(a)

What are the advantages of using fuzzy logic instead of Boolean logic? (5 marks)

(b)

Does absolute truth exist in fuzzy logic? Explain your answer. (5 marks)

(c)

Explain how something can be both partly true and partly false in fuzzy logic. (5 marks)

(d)

Describe the steps used in fuzzy rule based systems. (5 marks)

(e)

Consider the assertion “Boolean logic is just a special case of fuzzy logic”. Do you think this is true? Explain your answer. (5 marks)

2

(a)

Give 5 different kinds of uncertainty that can occur in data. (5 marks)

(b)

How does Mycin handle uncertainty? Give a couple of sample rules and show how the uncertainty is handled. (15 marks)

(c)

How does GDE detect faults in electrical circuits? (5 marks)

3

(a)

How does AI search differ from searches that are applied to data structures? (5 marks)

(b)

What are the differences between forward chaining and backward chaining? Give 2 examples where you think each should be applied. (15 marks)

(c)

Why is Depth first search with iterative deepening such a good search technique? (5 marks)

**PTO**

## **Section B**

4

- (a) What do you understand by the term ‘greedy algorithm’? (5 marks)
- (b) Consider the following graph. A is connected to B. A is connected to C. B is connected to A. B is connected to D. C is connected to A. C is connected to E. D is connected to B. D is connected to F. E is connected to C. E is connected to F. F is connected to D. F is connected to E. What in your view is the minimal number of colours needed to colour this graph? (8 marks)
- (c) Show how when considering the ordering A, B, C, D, E, F of the vertices in the above graph, a greedy algorithm will find this minimal number, and find one other ordering where it will not. (12 marks)

5

- (a) In the context of genetic algorithms, what do you understand by the term ‘evolving a strategy’? (5 marks)
- (b) Consider the following 10 by 10 two-dimensional world, based on Mitchell. The world mainly consists of empty squares, but in some squares there are tokens. An agent is required to collect tokens in this environment. The more tokens that are collected, the better. Available actions: Move north, south, east, west, do nothing, move randomly, pick up a token. Discuss the development of a genetic algorithm for evolving strategies in such an environment. (15 marks)
- (c) Is it always clear from inspection of an evolved genome what the strategy is? (5 marks)

6

“Centres like the Centre for Brains, Minds and Machines emerging from MIT, and programmes like the Human Brain Project now beginning in Europe represent two aspects of the future of AI. Of course, other viewpoints exist as well.” Discuss this statement. (25 marks)